

AB/AG/ADK-Z

(General purpose valve)
2, 3 port solenoid valve for dry air

■ For dry air (atmospheric dew point -60°C and over), inert gas, low vacuum (1.33 x 10² Pa (abs))

Overview

This product is a long service life solenoid valve for dry air control, created based on the reliable CKD general purpose valve. This valve is optimum for control of matters including dry air with an atmospheric dew point of -60°C and over, inert gases such as N₂, Ar and He gas, and as well as for low vacuums (1.33 x 10² Pa (abs)). An explosion proof type is available in addition to the direct acting type and pilot kick type, allowing use in a wide range of applications.

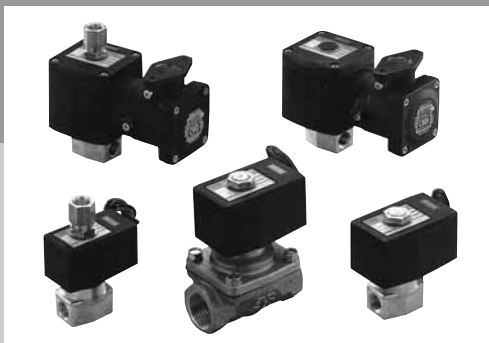
Features

Oil-free products

This valve is suited to elements susceptible to oil and dust, such as dry air, nitrogen gases, helium and low vacuum (1.33 x 10² Pa (abs)).

Flexible installation

Free installation attitude. Free swinging wave washer in the coil section enables unrestricted wiring directions.



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⚠ Always read the precautions in the Introduction and page 308 before starting use.

HNB/G

USB/G

FAB/G

FGB/G

FVB

FWB/G

FHB

FLB

AB

AG

AP/
AD

APK/
ADK

For
dry air

Explosion
proof

HVB/
HVL

SAB/
SVB

NP/NAP/
NVP

CHB/G

MXB/G

Other G.P.
systems

PD/FAD/
PJ

CVE/
CVSE

CPE/
CPD

Medical
analysis









Custom
order

General purpose valve for dry air

2, 3 port solenoid valve

Series variation

2, 3 port solenoid valve for dry air

No. of port	Model	Structure	Note	
2 port		AB31-Z	Direct acting/discrete	
		AB41-Z		
		GAB312-Z	Direct acting/manifold	
		GAB352-Z		
		GAB412-Z		
		GAB452-Z		
		AB41E4-Z	Direct acting explosion proof	Pressure and explosion proof structure d2G4 Certification number No. T64361
	ADK11-Z	Pilot kick type (Diaphragm structure)		
3 port		AG31-Z	Direct acting/discrete	
		AG41-Z		
		AG33-Z		
		AG43-Z		
		AG34-Z		
		AG44-Z		
	 <p>Actuator</p> 	GAG31*-Z	Direct acting/manifold	
		GAG35*-Z		
		GAG41*-Z		
		GAG45*-Z		
		GAG33*-Z		
		GAG43*-Z		
		GAG34*-Z		
		GAG44*-Z		
		AG41E4-Z	Direct acting explosion proof	Pressure and explosion proof structure d2G4 Certification number No. T64362
		AG43E4-Z		
		AG44E4-Z		

	Actuation	Fluid	Port size						Page		
			Rc1/8	Rc1/4	Rc3/8	Rc1/2	Rc3/4	Rc1			
	NC (normally closed) type	Dry air Inert gas Low vacuum	●	●					312		
				●	●					312	
										318	
										318	
										318	
										318	
						●	●				340
						●	●	●	●	●	348
			Universal type		●						322
			NC pressurization type		●						322
	NO pressurization type		●						322		
	Universal type	Common supply / individual exhaust	● ^{*1}	● ^{*1}						328	
			Common supply / separate flow	● ^{*2}	● ^{*2}						328
				Common supply / individual exhaust	● ^{*1}	● ^{*1}					328
				Common supply / separate flow	● ^{*2}	● ^{*2}					328
	NC pressurization type	Common supply / individual exhaust	● ^{*1}	● ^{*1}						332	
			● ^{*2}	● ^{*2}	● ^{*1}	● ^{*1}				332	
	NO pressurization type		● ^{*1}	● ^{*1}						336	
			● ^{*2}	● ^{*2}	● ^{*1}	● ^{*1}				336	
	Universal type			●	●				344		
	NC pressurization type			●	●				344		
	NO pressurization type			●	●				344		

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Other G.P.
systems
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PJ
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General purpose valve for dry air
2, 3 port solenoid valve








*1: Port A: Rc1/4, port C: Rc3/8
*2: ● shows NO port.

Coil selection guide

● Coil housing types and selection guide (excluding explosion proof type)

Wide coil variation is available.

Refer to the structure and features to select the optimum model.

Coil variations	Open frame type	Heat proof class B mold	<ul style="list-style-type: none"> ● DC ● Heat proof temperature 130°C ● Protection property symbols: IP65 or equivalent ● Outdoor use not available 	Lead wire	<ul style="list-style-type: none"> ● Lead wire length 300 mm ● Conduit (CTC19) for direct conduit wiring can be mounted 	 <p>3A</p>
		Heat proof class B mold	<ul style="list-style-type: none"> ● DC ● Heat proof temperature 130°C ● Protection property symbols: IP21 or equivalent ● Outdoor use not available 	HP terminal box	<ul style="list-style-type: none"> ● Easy wiring ● Light available 	 <p>3M 3N</p>
		Heat proof class B mold	<ul style="list-style-type: none"> ● DC and AC (50/60 Hz common) ● Heat proof temperature 130°C ● Protection property symbols: IP65 or equivalent ● Outdoor use not available 	HP terminal box	<ul style="list-style-type: none"> ● Easy wiring ● Light available (optional - 100, 200 VAC / 24, 100 VDC only) 	 <p>3I 3J</p>
		Heat proof class B mold with diode	<ul style="list-style-type: none"> ● A diode is mounted on the coil section for direct-current conversion (AC-DC conversion) ● AC dedicated (50/60 Hz common) ● Heat proof temperature 130°C ● Protection property symbols: IP65 or equivalent ● Outdoor use not available 	Lead wire	<ul style="list-style-type: none"> ● Lead wire length 300 mm ● Conduit (CTC19) for direct conduit wiring can be mounted 	 <p>5A</p>
		Heat proof class B mold with diode	<ul style="list-style-type: none"> ● A diode is mounted on the coil section for direct-current conversion (AC-DC conversion) ● AC dedicated (50/60 Hz common) ● Heat proof temperature 130°C ● Protection property symbols: IP21 or equivalent ● Outdoor use not available 	HP terminal box	<ul style="list-style-type: none"> ● Easy wiring ● Light available 	 <p>5M 5N</p>
		Heat proof class B mold with diode	<ul style="list-style-type: none"> ● A diode is mounted on the coil section for direct-current conversion (AC-DC conversion) ● AC dedicated (50/60 Hz common) ● Heat proof temperature 130°C ● Protection property symbols: IP65 or equivalent ● Perfect for places where heat can be a problem ● Outdoor use not available 	HP terminal box	<ul style="list-style-type: none"> ● Easy wiring ● Light available (optional - 100, 200 VAC only) 	 <p>5I 5J</p>
				Conduit	<ul style="list-style-type: none"> ● Use a conduit (CTC19 or G1/2) when using direct conduit wiring for the open frame lead wire. 	 <p>G H</p>

MEMO

- HNB/G
- USB/G
- FAB/G
- FGB/G
- FVB
- FWB/G
- FHB
- FLB
- AB
- AG
- AP/AD
- APK/ADK
- For dry air
- Explosion proof
- HVB/HVL
- SAB/SVB
- NP/NAP/NVP
- CHB/G
- MXB/G
- Other G.P. systems
- PD/FAD/PJ
- CVE/CVSE
- CPE/CPD
- Medical analysis
- Custom order

General purpose valve for dry air
 2, 3 port solenoid valve



Safety precautions

Always read this section before starting use.

Direct acting 2, 3 port solenoid valve for dry air (AB-Z/GAB-Z/AG-Z/GAG-Z)

Design & Selection

WARNING

1 Working fluid

- (1) The quality of the dry air used for the general purpose valve for dry air (Z Series) should have an atmospheric dew point of -60°C or more and oil removing rate of 0.1 PPMw/w or less.
- (2) This valve cannot be used for maintaining the vacuum. Consult with CKD when the vacuum needs to be maintained.

CAUTION

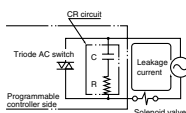
1 Continuous energizing

Use the NO pressurization type when using the 3 port valve in the continuously energized state with the NO port pressurized. When continuously energizing the universal or NC pressurization type, use a fluoro rubber seal.

2 Leakage current from other fluid control components

When operating the solenoid valve with a programmable controller, etc., check that the output leakage current from the programmable controller is within the specifications.

Failure to observe this could lead to malfunctions.



When Using

CAUTION

1 Manual operation

Always observe the following points when using a manual override.

<For NC (normally closed) type>

Opening: Insert a flat-tip screwdriver into the slit on the manual shaft, and turn it approx. 120° to the right or left. The plunger will rise up, and the valve will open. (When using the 3 port valve, the NC valve side will open, and the NO valve side will close.)

The open state is held even when the screwdriver is removed.

Always return the valve to the original position after use.

Closing: Turn the manual shaft from the open position to the vertical position. The plunger will lower and the valve will close. (When using the 3 port valve, the NC side valve seat will close, and the NO side valve seat will open.) (Refer to the following drawings.)



Valve closed



Valve opened



Valve opened

Installation, Piping & Wiring

CAUTION

1 Piping

- (1) Always hold the socket with a spanner, etc., if the NO side is a socket.

2 Wiring

Refer to page 53 in the Introduction for details on connecting the terminal box.

Maintenance

CAUTION

When disassembling or assembling, tighten the core assembly and socket with the following tightening torques.

Model no.	Core assembly tightening torque	Socket tightening torque	Nut tightening torque
AB	25 to 45 N·m	—	8 to 16 N·m
AG	25 to 45 N·m	8 to 16 N·m	8 to 16 N·m

Pilot kick type 2, 3 port solenoid valve for dry air (ADK-Z)

Design & Selection

⚠ WARNING

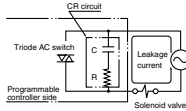
1 Working fluid

- (1) The quality of the dry air used for the general purpose valve for dry air (Z Series) should have an atmospheric dew point of -60°C or more and oil removing rate of 0.1 PPMw/w or less.
- (2) This valve cannot be used for maintaining the vacuum.

⚠ CAUTION

1 Leakage current from other fluid control components

When operating the solenoid valve with a programmable controller, etc., check that the output leakage current from the programmable controller is within the specifications.



Installation, Piping & Wiring

⚠ CAUTION

1 Installation

- (1) As a general rule, the valve must be installed vertically with the coil facing upward.

2 Piping

- (1) If the pipe vibrates when the solenoid valve is opened and closed, securely fix the piping.
- (2) When the regulator and solenoid valve are directly coupled, the parts could mutually vibrate causing resonance and chattering.
- (3) If the piping cross-section area on the fluid inlet is reduced, the operation may become unstable due to a differential pressure fault during valve operation. The piping on the fluid inlet must have a size that matches the valve port size.

3 Wiring

Refer to page 53 in the Introduction for details on connecting the terminal box.

When Using

⚠ CAUTION

1 Instantaneous leakage

With the pilot kick type 2 port valve, if sudden pressure is applied when the pump starts while the valve is closed, the valve may open for an instant causing fluid to leak. Caution is required during use.

Explosion proof type direct acting 2, 3 port solenoid valve for dry air

Design & Selection

CAUTION

1 Selection standards

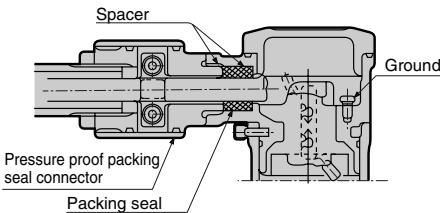
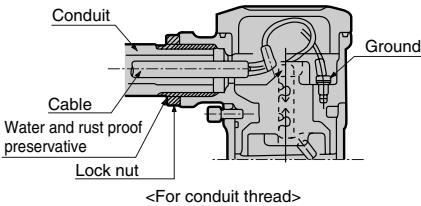
Thoroughly read and comprehend the section "Standards and approved parts" (pages 59 to 60 in the Introduction) for the selection standards for the explosion proof solenoid valve.

Installation, Piping & Wiring

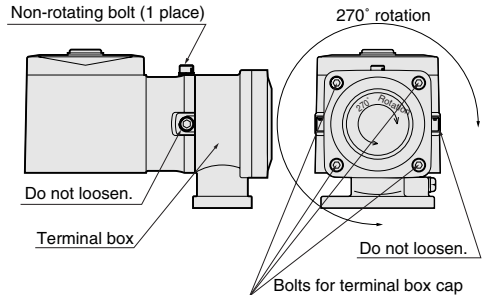
CAUTION

1 Wiring

(1) Refer to the following drawing when wiring.



(2) A terminal box rotates 270°. The orientation can be changed by loosening the non-rotating bolt. After wiring and setting the wiring direction, tighten the non-rotating bolt with a torque of 0.6 to 0.8 N·m to fix the terminal box. If the non-rotating bolt is loose, the terminal box could fall off during use. If the terminal box rotates, the rotating section could be damaged, or the internal wires could break. When laying the electric wires, do not loosen any bolts other than the four terminal box cap bolts and non-rotating bolt. Otherwise, the explosion-proof performance will not be guaranteed.



(3) Insert a fuse (1A), etc., in the electric circuit.

Maintenance

CAUTION

1 Maintenance of coil case section

If the coil case section, which has a pressure and explosion proof structure, must be disassembled when inspecting, consult with CKD.

For precautions other than above, refer to the precautions given in pages 124, 226 and 227 for the basic solenoid valves (direct acting general purpose valve and pilot kick type general purpose valve).

Working Environment

CAUTION

IP65 (IEC60529 (IEC529:1989-11)) standards are applied to the test. Avoid use in conditions where water or cutting oil directly contacts the valve.

Explanation of protection property symbols and examination method of IP65

● Protective structure

Note: IP-65 is a standard as followings.


■ IEC (International Electrotechnical Commission) standards

(IEC60529 (IEC529:1989-11))


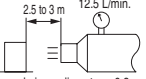
IP -

Protection property symbols (International Protection)

1st characteristic number (protection grade for foreign solid)

Grade	Degree of protection	
6	Dust proof type 	Powder and dust do not enter inside.

2nd characteristic number (protection grade for entry of water)

Grade	Degree of protection		Overview of test method (fresh water is used)
5	Protection for jet 	No harmful effects occur even when water is sprayed with nozzles from all directions.	<p>Using the following test device, spray water for 1 minute per 1 m² of test sample (exterior) surface area from all directions, for a total of 3 minutes or more.</p> <div style="text-align: center;">  <p>Spray nozzle inner diameter: ø6.3 mm</p> </div>

- HNB/G
- USB/G
- FAB/G
- FGB/G
- FVB
- FWB/G
- FHB
- FLB
- AB
- AG
- AP/AD
- APK/ADK
- For dry air
- Explosion proof
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General purpose valve for dry air
2, 3 port solenoid valve



Direct acting 2 port solenoid valve for dry air
(general purpose valve)

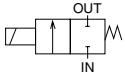
AB31/AB41-Z Series

- NC (normally closed) type
- Port size: Rc1/8 to Rc1/2



JIS symbol

- NC (normally closed) type



Common specifications

Item	Standard specifications
Working fluid	Dry air (atmospheric dew point -60°C or more), inert gas, low vacuum (1.33 x 10 ² Pa (abs))
Working pressure differential range MPa	0 to 4 (refer to max. working pressure differential in individual specifications.)
Max. working pressure MPa	5
Withstanding pressure (water) MPa	25
Fluid temperature °C	-10 to 45 (no freezing)
Ambient temperature °C	-10 to 45
Heat proof class	B
Atmosphere	Place free of corrosive gas and explosive gas
Valve structure	Direct acting poppet structure
Valve seat leakage cm ³ /min. (ANR)	0.2 or less
Mounting attitude	Free

Individual specifications

Item Model no.	Port size	Orifice (mm)	Max. working pressure diff. (MPa)	Rated voltage	Power consumption (W)						
					AC	DC					
AB31-01-1-*****Z	Rc1/8	1.5	2.5	100 VAC 50/60 Hz							
		2.0	1.5								
		3.0	0.5								
		4.0	0.2								
		5.0	0.12								
		6.0	0.12								
AB41-02-1-*****Z	Rc1/4	1.5	4.0	12 VDC 24 VDC 48 VDC 100 VDC	17	14					
		2.0	2.5								
		3.0	0.9								
		3.5	0.6								
		4.0	0.4								
		5.0	0.2								
		7.0	0.1								
		8.0	0.1								
		AB41-03-8-*****Z	Rc3/8, Rc1/2				10.0	0.03			

*1: The model numbers above show the basic port size (Rc). Refer to How to order for other combinations.

*2: The port size symbol is 01 for Rc1/8 (6A), 02 for Rc1/4 (8A), 03 for Rc3/8 (10A) and 04 for Rc1/2 (15A).

*3: Voltage fluctuation should be within ±10% of the rated voltage.

*4: Keep the leakage current at the following value or less.

*5: When using with a low vacuum, vacuum the OUT port side.

Leakage current	Voltage	100 VAC	200 VAC	12 VDC	24 VDC	48 VDC	100 VDC
	Model no.						
	AB31-**-1-*****Z	10 mA or less	5 mA or less	40 mA or less	20 mA or less	10 mA or less	5 mA or less
	AB41-**-1-*****Z	10 mA or less	5 mA or less	40 mA or less	20 mA or less	10 mA or less	5 mA or less

Flow characteristics

Model no.	Port size	Orifice (mm)	Flow characteristics	
			C [dm ³ /(s·bar)]	b
NC (normally closed) type				
AB31- ⁰¹ / ₀₂ -1-*****Z	Rc1/8 Rc1/4	1.5	0.29	0.53
		2.0	0.53	0.52
		3.0	1.1	0.52
		3.5	1.7 (1.5)	0.49 (0.47)
		4.0	2.1 (1.9)	0.48 (0.47)
		5.0	3.0 (2.6)	0.42 (0.38)
		7.0	4.8 (4.6)	0.29 (0.37)
AB41- ⁰² / ₀₃ -1-*****Z	Rc1/4 Rc3/8	1.5	0.29	0.53
		2.0	0.53	0.52
		3.0	1.1	0.52
		3.5	1.7 (1.5)	0.49 (0.47)
		4.0	2.1 (1.9)	0.48 (0.47)
		5.0	3.0 (2.6)	0.42 (0.38)
		7.0	4.8 (4.6)	0.29 (0.37)
AB41- ⁰³ / ₀₄ -8-*****Z	Rc3/8 Rc1/2	10.0	9.3 (8.1)	0.36 (0.31)

*1: Effective sectional area S and sonic conductance C are converted as $S = 5.0 \times C$.

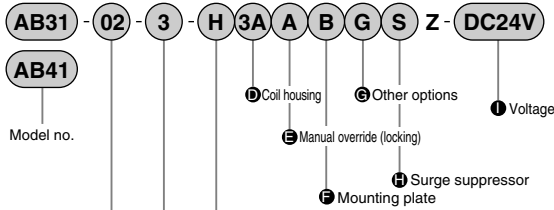
*2: Values shown in () are for stainless steel body.

HNB/G
USB/G
FAB/G
FGB/G
FVB
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CVE/
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Medical
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Custom
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General purpose valve for dry air
Direct acting 2 port solenoid valve

AB31/41-Z Series

How to order



Model no.

						Model no.		
						AB31	AB41	AB41
						Low pressure large flow rate		
Symbol	Descriptions	Symbol	Descriptions	Symbol	Descriptions			
A Port size								
01	Rc 1 / 8	1G	G 1 / 8	1N	NPT 1 / 8	●		
02	Rc 1 / 4	2G	G 1 / 4	2N	NPT 1 / 4	●	●	
03	Rc 3 / 8	3G	G 3 / 8	3N	NPT 3 / 8		●	
04	Rc 1 / 2	4G	G 1 / 2	4N	NPT 1 / 2			
B Orifice								
1	ø1.5					●	●	
2	ø2					●	●	
3	ø3					●	●	
4	ø3.5					●	●	
5	ø4					●	●	
6	ø5					●	●	
7	ø7						●	
8	ø10							●
C Body/sealant combination								
	Body	Sealant	Treatment	Remarks				
H	Brass	Nitrile rubber	Oil free	—	●	●	●	
J		Fluoro rubber		—	●	●	●	
P		Ethylene propylene diene rubber		—	●	●	●	
L		Nitrile rubber		—	●	●	●	
M		Fluoro rubber		—	●	●	●	
R		Ethylene propylene diene rubber		—	●	●	●	

*1

Refer to page 36 in the Introduction for details on the material combinations.

D to I

Refer to the following page for details on the coil housing, other options and voltage, etc.

The combinations indicated with ● in the above table are available.

<Example of model number>

AB31-02-3-H3ABSZ-DC24V
Series: AB31

- A** Port size : Rc1/4
- B** Orifice : ø3
- C** Body/sealant combination : Body - brass, sealant - nitrile rubber
- D** Coil housing : Open frame lead wire for DC voltage
- E** Manual override (locking) : Blank
- F** Mounting plate : Selected
- G** Other options : Blank
- H** Surge suppressor : Selected
- I** Voltage : 24 VDC

Note on model no. selection




Note on **C**


*1: The body for the low pressure large flow rate AB41-03/04-8 is bronze (standard) or stainless steel (optional).

For ③ to ①, the combinations indicated with symbols can be manufactured.
 Note that if options ⑤ to ⑨ are not required, no symbol is indicated.

D		E		F			G		H		I		
Coil housing		Manual override (locking)		Mounting plate			Cable gland (Marine cable gland)		Conduit (Conduit pipe)		Surge suppressor		
Descriptions											Descriptions		
3A	Open frame type	Lead wire		A	B	D	E	F	G	H	S	12 VCD, 24 VDC, 48 VDC, 100 VDC	
3M		HP terminal box (G1/2)											
3N		HP terminal box + light (G1/2)											
3I		HP terminal box (IP65 or equivalent) (G1/2)											
3J	HP terminal box + light (IP65 or equivalent) (G1/2)										12 VCD, 24 VDC, 48 VDC, 100 VDC		
5A	Open frame type (Diode integrated)	Lead wire		A	B	D	E	F	G	H		S	100 VAC, 200 VAC
5M		HP terminal box (G1/2)											
5N		HP terminal box + light (G1/2)											
5I		HP terminal box (IP65 or equivalent) (G1/2)											
5J		HP terminal box + light (IP65 or equivalent) (G1/2)											

⚠ Refer to the following precautions for ③ to ①.

3A 5A		<ul style="list-style-type: none"> ● Open frame grommet lead wire 300 mm ● 5A (diode integrated)
3M 3N 5M 5N		<ul style="list-style-type: none"> ● Open frame HP terminal box ● 5M, 5N (diode integrated)
3I 3J 5I 5J		<ul style="list-style-type: none"> ● Open frame HP terminal box (IP65 or equivalent) ● 5I, 5J (diode integrated)

G H		<ul style="list-style-type: none"> ● Conduit ● G (CTC19) ● H (G1/2)
--------	---	--

Refer to page 306 for coil selection.

⚠ Note on model no. selection

Note on ④

- *2: 5A, 5M, 5N, 5I and 5J are coils for which AC power is converted to DC with a diode.
Not compatible with voltages less than 100 VAC.

Note on ⑤ to ⑨

- * 3: The manual override (⑤ A) is not available for the low pressure large flow rate AB41-03/04-8.
- * 4: Select one among D, E, F, G and H for ⑥.
- * 5: The surge suppressor is an accessory for the lead wire coil. When selecting a coil with terminal box, the surge suppressor is mounted in the terminal box.
- * 6: The surge suppressor is incorporated in the coil with diode as standard.
- * 7: Tropicalization (rust-proof coating) is available as a measure against rust. Contact CKD for more information.
Note that the tropicalization is not available when the manual override option A is selected.

Note on ⑧

- * 8: 100 VAC coil is compatible with 100 VAC 50/60 Hz, and 200 VAC coil is compatible with 200 VAC 50/60 Hz.
- * 9: For voltages other than above, consult with CKD.
- *10: The lead wire is available in the standard 300 mm length, and 500 mm, 1000 mm, 2000 mm and 3000 mm lengths. Contact CKD for more information.

HNB/G

USB/G

FAB/G

FGB/G

FVB

FWB/G

FHB

FLB

AB

AG

AP/
AD

APK/
ADK

For
dry air

Explosion
proof

HVB/
HVL

SAB/
SVB

NP/NAP/
NVP

CHB/G

MXB/G

Other G.P.
systems

PD/FAD/
PJ

CVE/
CVSE

CPE/
CPD

Medical
analysis

Custom
order

General purpose valve for dry air
Direct acting 2-port solenoid valve

AB31/41-Z Series

Internal structure and parts list

● AB31/41-Z Series

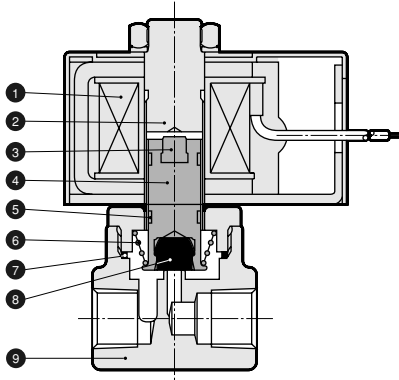


Figure shows AB31.






No.	Parts name	Material	No.	Parts name	Material
1	Coil assembly	-	6	Plunger spring	SUS304
2	Core assembly	SUS405 or equivalent, 316, 403 *1	7	O ring	NBR (FKM, EPDM)
3	Plunger cushion	PFA	8	Valve sealant	NBR (FKM, EPDM)
4	Plunger	SUS405 or equivalent	9	Body	C3771, CAC407 (SUS303)
5	Wear ring	POM			
		Acetar resin			
					Stainless steel
					NBR: Nitrile rubber (FKM: Fluoro rubber) (EPDM: Ethylene propylene diene rubber)
					Brass, bronze (stainless steel)






*1: When the body/sealant combination symbol is other than H, the material is SUS405 or equivalent, 316L, 430.

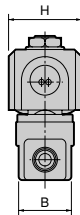
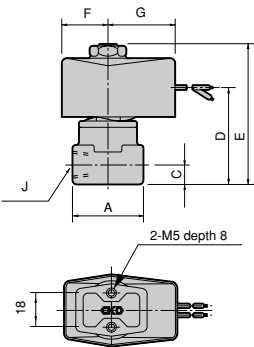
() shows options.

Dimensions

● Open frame lead wire type

AB31/41-**-1 to 7-|****Z

AB41-03/04-8-|****Z



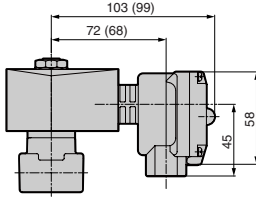
Model no.	A	B	C	D	E	F	G	H	J
AB31-⁰¹₀₂-1 to 6-****Z	36	28	11	50.5	75	24	38	38	Rc1/8 Rc1/4
AB41-02-1 to 6-****Z	36	28	11	52	80.5	28	42	46	Rc1/4
AB41-⁰²⁻⁷₀₃-1 to 7-****Z	40	28	12	55	83.5	28	42	46	Rc1/4 Rc3/8
AB41-⁰³₀₄-8-****Z	50	29	15	64	92.6	28	42	46	Rc3/8 Rc1/2

Optional dimensions



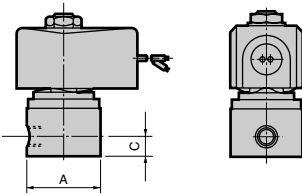
* Refer to the open frame lead wire type dimensions on the left page for common dimensions.

- Open frame type + HP terminal box
AB31/41-**-**Z



Dimensions shown in () are for AB31 Series.

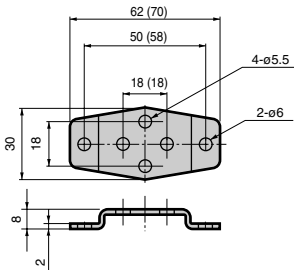
- Stainless steel body
AB31/41-**-**Z



Model no.	A	C
AB31- ⁰¹ / ₀₂ -1 to 6-***Z	ø37.5	11
AB41-02-1 to 6-***Z	ø37.5	11
AB41- ⁰²⁻⁷ / ₀₃₋₁ to 7 -***Z	ø45	12
AB41- ⁰³ / ₀₄ -8-***Z	50 ^{*1}	15

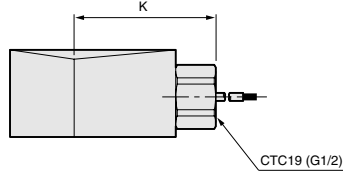
*1 (Max. dimension ø54)

- Mounting plate
AB31/41-**-**Z



Dimensions shown in () are for the mounting plate No. 2.

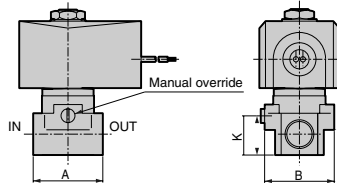
- Open frame type + conduit
AB31/41-**-1 to 7-*



Dimensions shown in () are for G1/2.

Model no.	K
AB31-*	53 (56)
AB41-*	57 (60)

- Manual override (locking)
AB31/41-**-**A***Z
(Figure shows the brass body)



Model no.	A	B	K
AB31- ⁰¹ / ₀₂ -1 to 6-**A***Z	36	38 (ø37.5)	19.5
AB41-02-1 to 6-**A***Z	36	38 (ø37.5)	19.5
AB41- ⁰²⁻⁷ / ₀₃₋₁ to 7 -**A***Z	40	40 (ø45)	22.5

Values shown in () are for stainless steel body.

Model no.	Applicable model
Mounting plate No. 1 GE-100106	<ul style="list-style-type: none"> ● AB31 all series ● AB41-⁰²/₀₃-1 to 7-[H/J/P] ● Stainless steel body AB41-02-1 to 6-[L/M/R]
Mounting plate No. 2 GE-100159	<ul style="list-style-type: none"> ● AB41-⁰³/₀₄-8 Series ● Stainless steel body AB41-02-7-[L/M/R] AB41-03-1 to 7-[L/M/R]

HNB/G
USB/G
FAB/G
FGB/G
FVB
FWB/G
FHB
FLB
AB
AG
AP/
AD
APK/
ADK
For
dry air
Explosion
proof
HVB/
HVL
SAB/
SVB
NP/NAP/
NVP
CHB/G
MXB/G
Other G.P.
systems
PD/FAD/
PJ
CVE/
CVSE
CPE/
CPD
Medical
analysis
Custom
order

General purpose valve for dry air
Direct acting 2 port solenoid valve



Direct acting 2 port solenoid valve for dry air, manifold and actuator (general purpose valve)

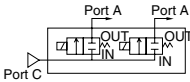
GAB312/GAB352/GAB412/GAB452-Z Series

- NC (normally closed) type
- Common supply type (port C pressurization), individual supply type (port A port pressurization)

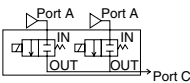


JIS symbol

- GAB312/412-Z
(Common supply type / port C pressurization)



- GAB352/452-Z
(Individual supply type / port A pressurization)



Common specifications

Item	Standard specifications
Working fluid	Dry air (atmospheric dew point -60°C or more), inert gas, low vacuum (1.33 x 10 ⁵ Pa (abs))
Working pressure differential range MPa	0 to 4 (refer to max. working pressure differential in individual specifications.)
Max. working pressure MPa	5
Withstanding pressure (water) MPa	10
Fluid temperature °C	-10 to 45 (no freezing)
Ambient temperature °C	-10 to 45
Heat proof class	B
Atmosphere	Place free of corrosive gas and explosive gas
Valve structure	Direct acting poppet structure
Valve seat leakage cm ³ /min. (ANR)	0.2 or less
Mounting attitude	Free

Individual specifications

Item Model no.	Port size	Orifice (mm)	Max. working pressure diff. (MPa)	Rated voltage	Power consumption (W)	
					AC 50/60 Hz	DC
GAB312/352-1-Z	—	1.5	2.5	100 VAC 50/60 Hz	17	14
-2-Z		2.0	1.5			
-3-Z		3.0	0.5			
-4-Z		3.5	0.35			
-5-Z		4.0	0.2			
-6-Z		5.0	0.12			
GAB412/452-1-Z	—	1.5	4.0	200 VAC 50/60 Hz	17	14
-2-Z		2.0	2.5			
-3-Z		3.0	0.9			
-4-Z		3.5	0.6			
-5-Z		4.0	0.4			
-6-Z		5.0	0.2			
-7-Z		7.0	0.1			

*1: The model numbers above show the basic orifice diameter. Refer to How to order for other combinations.

*2: Refer to How to order (page 320) and Dimensions (pages 154 to 157) for the port size.

*3: Voltage fluctuation should be within ±10% of the rated voltage.

*4: Keep the leakage current at the following value or less.

*5: When using with a low vacuum, vacuum the OUT port side.

Leakage current	Voltage						
	100 VAC	200 VAC	12 VDC	24 VDC	48 VDC	100 VDC	
Model no.							
GAB312/352*-*.*****Z	10 mA or less	5 mA or less	40 mA or less	20 mA or less	10 mA or less	5 mA or less	
GAB412/452*-*.*****Z	10 mA or less	5 mA or less	40 mA or less	20 mA or less	10 mA or less	5 mA or less	

Flow characteristics

Model no.	Port size	Orifice (mm)	Flow characteristics	
			C [dm ³ /(s·bar)]	b
GAB312/352-1-Z	-	1.5	0.29	0.53
-2-Z		2.0	0.53	0.52
-3-Z		3.0	1.1	0.52
-4-Z		3.5	1.5	0.47
-5-Z		4.0	1.9	0.47
-6-Z		5.0	2.6	0.38
GAB412/452-1-Z	-	1.5	0.29	0.53
-2-Z		2.0	0.53	0.52
-3-Z		3.0	1.1	0.52
-4-Z		3.5	1.5	0.47
-5-Z		4.0	1.9	0.47
-6-Z		5.0	2.6	0.38
-7-Z		7.0	4.6	0.37

*1: Effective sectional area S and sonic conductance C are converted as $S \approx 5.0 \times C$.

Internal structure and parts list

This is the same as the AB31/41-Z Series. Refer to page 316.

Dimensions

This is the same as the GAB Series open frame type. Refer to pages 154 to 157.

HNB/G

USB/G

FAB/G

FGB/G

FVB

FWB/G

FHB

FLB

AB

AG

AP/
ADAPK/
ADKFor
dry airExplosion
proofHVB/
HVLSAB/
SVBNP/NAP/
NVP

CHB/G

MXB/G

Other G.P.
systemsPD/FAD/
PJCVE/
CVSECPE/
CPDMedical
analysisCustom
orderCustom
order
 General purpose valve for dry air
Direct acting 2 port solenoid valve

GAB312/352/412/452-Z Series

How to order

- Common supply type (port C pressurization)

GAB312 - 1 - 5 - H 5A A G S Z - AC100V

- Individual supply type (port A pressurization) ● Coil housing ● Surge suppressor

GAB352

● Manual override (locking) ● Voltage

- Common supply type (port C pressurization)

GAB412

● Other options

- Individual supply type (port A pressurization)

GAB452

● Type of thread

Model no.

● Orifice

● Station no.

*2

● Body/sealant combination

Model no.	
GAB312	GAB412
GAB352	GAB452

Symbol	Descriptions					
A Type of thread						
Blank	Rc	●	●			
G	G	●	●			
N	NPT	●	●			
B Orifice						
1	ø1.5	●	●			
2	ø2	●	●			
3	ø3	●	●			
4	ø3.5	●	●			
5	ø4	●	●			
6	ø5	●	●			
7	ø7		●			
C Station no.						
2	2 stations					
to	to					
10	10 stations	●	●			
0	Only actuator	●	●			
D Body/sealant combination						
	Body	Sealant	Treatment	Remarks	●	●
H	Brass	Nitrile rubber	Oil free	-	●	●
J		Fluoro rubber		-	●	●
P		Ethylene propylene diene rubber		-	●	●
L	Stainless steel	Nitrile rubber		-	●	●
M		Fluoro rubber		-	●	●
R		Ethylene propylene diene rubber		-	●	●
Refer to page 36 in the Introduction for details on the material combinations.						
E to I						
Refer to the following page for details on the coil housing, other options and voltage, etc.						

The combinations indicated with ● in the above table are available.

<Example 1 of model number>

GAB312-1-3-H5AZ-AC200V

Series: GAB312

(common supply type port C pressurization)

- Type of thread : Rc
- Orifice : ø1.5
- Station no. : 3 stations
- Body/sealant combination : Body - brass, sealant - nitrile rubber
- Coil housing : Open frame (diode integrated) lead wire for AC voltage
- to ● : Blank
- Rated voltage : 200 VAC 50/60 Hz

<Example 2 of model number>

GAB352G-5-2-H3AASZ-DC24V

Series: GAB352

(individual supply type port A pressurization)

- Type of thread : G
- Orifice : ø4
- Station no. : 2 stations
- Body/sealant combination : Body - brass, sealant - nitrile rubber
- Coil housing : Open frame lead wire for DC voltage
- Manual override (locking) : Selected
- Other options : Blank
- Surge suppressor : Selected
- Rated voltage : 24 VDC

▲ Note on model no. selection

*1: Discrete masking plate and sub-plate are available. Contact CKD for more information.




Note on ● and ●


*2: Consult with CKD about more than 10 stations manifold.

For ⑥ to ⑩, the combinations indicated with symbols can be manufactured.
 Note that if options ⑥ to ⑨ are not required, no symbol is indicated.

⑥ Coil housing		⑦ Manual override (locking)		⑧ Other options					⑨ Surge suppressor	⑩ Rated voltage			
Descriptions		Cable gland (Marine cable gland)			Conduit (Conduit pipe)		G		H	I Descriptions			
		A-15a	A-15b	A-15c	CTC19	G1/2							
3A	Open frame type	Lead wire							G	H	S	12 VCD, 24 VDC, 48 VDC, 100 VDC	
3M		HP terminal box (G1/2)											12 VCD, 24 VDC, 100 VDC 12 VCD, 24 VDC, 48 VDC, 100 VDC 12 VDC, 24 VDC, 100 VDC
3N		HP terminal box + light (G1/2)											
3I		HP terminal box (IP65 or equivalent) (G1/2)		D	E	F							
3J	HP terminal box + light (IP65 or equivalent) (G1/2)												
5A	Open frame type (Diode integrated)	Lead wire							G	H	100 VAC, 200 VAC		
5M		HP terminal box (G1/2)											
5N		HP terminal box + light (G1/2)											
5I		HP terminal box (IP65 or equivalent) (G1/2)		D	E	F							
5J	HP terminal box + light (IP65 or equivalent) (G1/2)												

⚠ Refer to the following precautions for ⑥ to ⑩.

3A 5A		<ul style="list-style-type: none"> ● Open frame grommet lead wire 300 mm ● 5A (diode integrated)
3M 3N 5M 5N		<ul style="list-style-type: none"> ● Open frame HP terminal box ● 5M, 5N (diode integrated)
3I 3J 5I 5J		<ul style="list-style-type: none"> ● Open frame HP terminal box (IP65 or equivalent) ● 5I, 5J (diode integrated)

G H		<ul style="list-style-type: none"> ● Conduit (CTC19) ● H (G1/2)
--------	---	---

Refer to page 306 for coil selection.

⚠ Note on model no. selection

Note on ⑥

* 3: 5A, 5M, 5N, 5I and 5J are coils for which AC power is converted to DC with a diode.

Note on ⑧ and ⑨

- * 4: Select one among D, E, F, G and H for ⑧.
- * 5: The surge suppressor is an accessory for the lead wire coil. When selecting a coil with terminal box, the surge suppressor is mounted in the terminal box.
- * 6: The surge suppressor is incorporated in the coil with diode as standard.
- * 7: Tropicalization (rust-proof coating) is available as a measure against rust. Contact CKD for more information.
 Note that the tropicalization is not available when the manual override option A is selected.

Note on ⑩

- * 8: 100 VAC coil is compatible with 100 VAC 50/60 Hz, and 200 VAC coil is compatible with 200 VAC 50/60 Hz.
- * 9: For voltages other than above, consult with CKD.
- * 10: The lead wire is available in the standard 300 mm length, and 500 mm, 1000 mm, 2000 mm and 3000 mm lengths. Contact CKD for more information.

HNB/G

USB/G

FAB/G

FGB/G

FVB

FWB/G

FHB

FLB

AB

AG

AP/AD

APK/ADK

For dry air

Explosion proof

HVB/HVL

SAB/SVB

NP/NAP/NVP

CHB/G

MXB/G

Other G.P. systems

PD/FAD/PJ

CVB/CVSE

CPE/CPD

Medical analysis

Custom order

General purpose valve for dry air

Direct acting 2 port solenoid valve

AP/APK/AD/ADK

(General purpose valve)

General purpose pilot operated 2 port solenoid valve

■ For air, vacuum, water, oil

Overview

The general purpose valve series enables control of various types of fluids including water, air, oil and vacuums. In addition to the high reliability and high quality of the valve, the variety of options and variations are available.

Features

Various working fluids control

Various types of fluids can be handled by selecting the proper body material and sealant.

Wide option range

Including open frame, coil with diode, and terminal boxes.

A great variety of series and variation

A wide selection is available from the Rc1/4 to large 50 flanges with series such as pilot operated diaphragm and piston valves, and pilot kick type diaphragm and piston valves.



CONTENTS

Series variation	220
Coil selection guide	222
⚠ Safety precautions	226

Pilot operated 2 port solenoid valve

Piston structure

● AP11/12	NC (normally closed) type / NO (normally open) type	228
● AP21/22	NC (normally closed) type / NO (normally open) type	238

Diaphragm structure

● AD11/12	NC (normally closed) type / NO (normally open) type	248
● AD21/22	NC (normally closed) type / NO (normally open) type	258

Pilot kick type 2 port solenoid valve

Piston structure

● APK11	NC (normally closed) type	268
● APK21	NC (normally closed) type	276

Diaphragm structure

● ADK11/12	NC (normally closed) type / NO (normally open) type	282
● APK21	NC (normally closed) type	294



Electronic Catalog file list	300
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⚠ Always read the precautions in the Introduction and page 226 before starting use.

HNB/G

USB/G

FAB/G

FGB/G

FVB

FWB/G

FHB

FLB

AB

AG

AP/
AD

APK/
ADK

For
dry air

Explosion
proof

HVB/
HVL

SAB/
SVB

NP/NAP/
NVP

CHB/G

MXB/G

Other G.P.
systems

PD/FAD/
PJ

CVE/
CVSE

CPE/
CPD





Medical
analysis

Custom
order

General purpose valve
Pilot operated/Pilot kick type 2 port solenoid valve

Series variation

General purpose pilot operated 2 port solenoid valve

No. of port	Model	Structure	Actuation	Working fluid							
				Air	Low vacuum (1.33 x 10 ³ Pa (abs))	Water	Kerosene	Oil (50 mm ² /s or less)	Hot water	Steam	
2 port		AP11 *1	Pilot operated (Piston structure)	NC (normally closed) type	●		●	●	●		●
		AP12 *1		NO (normally open) type	●		●	●	●		●
		AP21		NC (normally closed) type	●		●	●	●		●
		AP22		NO (normally open) type	●		●	●	●		●
		AD11 *1	Pilot operated (Diaphragm structure)	NC (normally closed) type	●		●	●	●		
		AD12 *1		NO (normally open) type	●		●	●	●		
		AD21		NC (normally closed) type	●		●	●	●		
		AD22		NO (normally open) type	●		●	●	●		
		APK11	Pilot kick type (Piston kick drive)	NC (normally closed) type	●	●	●	●	●*2		●
		APK21		NC (normally closed) type	●	●	●	●	●*2		●
		ADK11	Pilot kick type (Diaphragm structure)	NC (normally closed) type	●	●	●	●	●	●	
		ADK12		NO (normally open) type	●	●	●	●	●	●	
ADK21		NC (normally closed) type		●	●	●	●	●			

*2: 20 mm²/s or less for APK11/12 Series.

	Port size											Page
	Rc1/4	Rc3/8	Rc1/2	Rc3/4	Rc1	Rc1 1/4	32 flange	Rc1 1/2	40 flange	Rc2	50 flange	
	● ^{*3}	● ^{*3}	● ^{*3}	● ^{*3}	● ^{*3}							228
	● ^{*3}	● ^{*3}	● ^{*3}	● ^{*3}	● ^{*3}							228
						●	●	●	●	●	●	238
						●	●	●	●	●	●	238
	● ^{*3}	● ^{*3}	● ^{*3}	● ^{*3}	● ^{*4}							248
			● ^{*3}	● ^{*3}	● ^{*4}							248
						●	●	●	●	●	●	258
						●	●	●	●	●	●	258
	● ^{*3}	● ^{*3}	● ^{*3}	● ^{*3}	● ^{*3}							268
						●	●	●	●	●	●	276
	● ^{*3}	● ^{*3}	● ^{*3}	● ^{*3}	● ^{*3}							282
			● ^{*3}	● ^{*3}	● ^{*3}							282
						●	●	●	●	●	●	294

*3: Refer to each How to order column for the thread types.

Refer to page 222 for details on the coil system.

HNB/G
 USB/G
 FAB/G
 FGB/G
 FVB
 FWB/G
 FHB
 FLB
 AB
 AG
 AP/
 AD
 APK/
 ADK
 For
 dry air
 Explosion
 proof
 HVB/
 HVL
 SAB/
 SVB
 NP/NAP/
 NVP
 CHB/G
 MXB/G
 Other G.P.
 systems
 PD/FAD/
 PJ
 CVE/
 CVSE
 CPE/
 CPD
 Medical
 analysis
 Custom
 order












General purpose valve
 Pilot operated/Pilot kick type 2 port solenoid valve

Coil selection guide

● Coil housing types and selection guide

A wide variety is available to match applications.

Refer to the structure and features to select the optimum model.

AP/AD*		Appearance			
Coil variations	Heat proof class B mold	<ul style="list-style-type: none"> ● AC dedicated (50/60 Hz common) ● Heat proof temperature 130°C ● Protection property symbols: IP61 or equivalent ● Outdoor use not available 	Grommet lead wire <ul style="list-style-type: none"> ● Lead wire length 300 mm 	 2C 6C	
		<ul style="list-style-type: none"> ● DC and AC (50/60 Hz common) ● Heat proof temperature 130°C ● Protection property symbols: IP61 or equivalent ● Outdoor use not available 	DIN terminal box <ul style="list-style-type: none"> ● Easy wiring and maintenance ● Reliable electric protection (ground terminal) ● Light available (optional - 100, 200 VAC and 24 VDC only) 	 2E 2G 2H 6E 6G 6H	
		<ul style="list-style-type: none"> ● DC and AC (50/60 Hz common) ● Heat proof temperature 130°C ● Protection property symbols: IP65 or equivalent ● Outdoor use not available 	Lead wire <ul style="list-style-type: none"> ● Lead wire length 300 mm ● Conduit (CTC19) for direct conduit wiring can be mounted 	 3A	
		<ul style="list-style-type: none"> ● DC and AC (50/60 Hz common) ● Heat proof temperature 130°C ● Protection property symbols: IP21 or equivalent ● Outdoor use not available 	HP terminal box <ul style="list-style-type: none"> ● Easy wiring ● Light available (optional - 100, 200 VAC / 24, 100 VDC only) 	 3M 3N	
		<ul style="list-style-type: none"> ● DC and AC (50/60 Hz common) ● Heat proof temperature 130°C ● Protection property symbols: IP65 or equivalent ● Outdoor use not available 	HP terminal box <ul style="list-style-type: none"> ● Easy wiring ● Light available (optional - 100, 200 VAC / 24, 100 VDC only) 	 3I 3J	
		<ul style="list-style-type: none"> ● AC dedicated (50/60 Hz common) ● Heat proof temperature 130°C ● High temperature fluid and high ambient temperature available ● Outdoor use not available ● Protection property symbols: IP00 	Lead wire <ul style="list-style-type: none"> ● Lead wire length 300 mm ● Conduit (CTC19) for direct conduit wiring can be mounted 	 4A	
	Heat proof class H taped	<ul style="list-style-type: none"> ● AC dedicated (50/60 Hz common) ● Heat proof temperature 130°C ● Protection property symbols: IP21 or equivalent ● Outdoor use not available 	HP terminal box <ul style="list-style-type: none"> ● Easy wiring ● Light available (optional - 100, 200 VAC only) 	 4M 4N	
		<ul style="list-style-type: none"> ● A diode is mounted on the coil section for direct-current conversion (AC-DC conversion) ● AC dedicated (50/60 Hz common) ● Heat proof temperature 130°C ● Protection property symbols: IP65 or equivalent ● Perfect for places where beat can be a problem ● Outdoor use not available 	Lead wire <ul style="list-style-type: none"> ● Lead wire length 300 mm ● Conduit (CTC19) for direct conduit wiring can be mounted 	 5A	
		<ul style="list-style-type: none"> ● A diode is mounted on the coil section for direct-current conversion (AC-DC conversion) ● AC dedicated (50/60 Hz common) ● Heat proof temperature 130°C ● Protection property symbols: IP21 or equivalent ● Perfect for places where beat can be a problem ● Outdoor use not available 	HP terminal box <ul style="list-style-type: none"> ● Easy wiring ● Light available (optional - 100, 200 VAC only) 	 5M 5N	
		<ul style="list-style-type: none"> ● A diode is mounted on the coil section for direct-current conversion (AC-DC conversion) ● AC dedicated (50/60 Hz common) ● Heat proof temperature 130°C ● Protection property symbols: IP65 or equivalent ● Perfect for places where beat can be a problem ● Outdoor use not available 	HP terminal box <ul style="list-style-type: none"> ● Easy wiring ● Light available (optional - 100, 200 VAC only) 	 5I 5J	
		Open frame type	<ul style="list-style-type: none"> ● Use a conduit (CTC19 or G1/2) when using direct conduit wiring for the open frame lead wire. 	Conduit <ul style="list-style-type: none"> ● Use a conduit (CTC19 or G1/2) when using direct conduit wiring for the open frame lead wire. 	 G H

● Repair parts table per coil option

Coil option symbol	Voltage	Repair parts			
		Plunger assembly	Core assembly	Coil assembly	Actuator assembly *1
0 or 2C	AC	○	○	○	○
6C *2	DC	—	—	—	○
2E 2G 2H	AC	○	○	○	○
2E 2G 2H	DC	○	○	○	○
6E 6G 6H *2	DC	—	—	—	○
3A	AC	○	○	○	○
	DC		○	○	○
3M 3N	AC	○	○	○	○
	DC		○	○	○
3I 3J	AC	○	○	○	○
	DC		○	○	○
4A	AC	○	○	○	○
4M 4N	AC	○	○	○	○
5A	AC	○	○	○	○
5M 5N	AC	○	○	○	○
5I 5J	AC	○	○	○	○

*1: The actuator assembly includes the coil assembly, core assembly and plunger assembly.

*2: As 6C, 6E, 6G and 6H are dedicated parts, they are provided as part of the actuator assembly.

HNB/G
USB/G
FAB/G
FGB/G
FVB
FWB/G
FHB
FLB
AB
AG
AP/
AD
APK/
ADK
For
dry air
Explosion
proof
HVB/
HVL
SAB/
SVB
NP/NAP/
NVP
CHB/G
MXB/G
Other G.P.
systems
PD/FAD/
PJ
CVE/
CVSE
CPE/
CPD
Medical
analysis
Custom
order

General purpose valve
Pilot operated/Pilot kick type 2 port solenoid valve












Coil selection guide

● Coil housing types and selection guide

Wide coil variation is available.








Refer to the structure and features to select the optimum model.

APK11/ADK1*

Coil variations		Open frame type		Appearance		
Coil variations	Heat proof class B mold	<ul style="list-style-type: none"> ● AC dedicated (50/60 Hz common) ● Heat proof temperature 130°C ● Protection property symbols: IP61 or equivalent ● Outdoor use not available 	Grommet lead wire	<ul style="list-style-type: none"> ● Lead wire length 300 mm 	 2C	
	Heat proof class B mold	<ul style="list-style-type: none"> ● DC and AC (50/60 Hz common) ● Heat proof temperature 130°C ● Protection property symbols: IP61 or equivalent ● Outdoor use not available 	DIN terminal box	<ul style="list-style-type: none"> ● Easy wiring and maintenance ● Reliable electric protection (ground terminal) ● Light available (optional - 100, 200 VAC and 24 VDC only) 	 2E 2G 2H	
	Heat proof class B mold	<ul style="list-style-type: none"> ● DC and AC (50/60 Hz common) ● Heat proof temperature 130°C ● Protection property symbols: IP65 or equivalent ● Outdoor use not available 	Lead wire	<ul style="list-style-type: none"> ● Lead wire length 300 mm ● Conduit (CTC19) for direct conduit wiring can be mounted 	 3A	
	Heat proof class B mold	<ul style="list-style-type: none"> ● DC and AC (50/60 Hz common) ● Heat proof temperature 130°C ● Protection property symbols: IP21 or equivalent ● Outdoor use not available 	HP terminal box	<ul style="list-style-type: none"> ● Easy wiring ● Light available (optional - 100, 200 VAC / 24, 100 VDC only) 	 3M 3N	
	Heat proof class B mold	<ul style="list-style-type: none"> ● DC and AC (50/60 Hz common) ● Heat proof temperature 130°C ● Protection property symbols: IP65 or equivalent ● Outdoor use not available 	HP terminal box	<ul style="list-style-type: none"> ● Easy wiring ● Light available (optional - 100, 200 VAC / 24, 100 VDC only) 	 3J 3I *1	
	Open frame type	Heat proof class H tapped	<ul style="list-style-type: none"> ● AC dedicated (50/60 Hz common) ● Heat proof temperature 180°C ● High temperature fluid and high ambient temperature available ● Outdoor use not available ● Protection property symbols: IP00 	Lead wire	<ul style="list-style-type: none"> ● Lead wire length 300 mm ● Conduit (CTC19) for direct conduit wiring can be mounted 	 4A
		Heat proof class B mold with diode	<ul style="list-style-type: none"> ● A diode is mounted on the coil section for direct-current conversion (AC-DC conversion) ● AC dedicated (50/60 Hz common) ● Heat proof temperature 130°C ● Protection property symbols: IP65 or equivalent ● Perfect for places where heat can be a problem ● Outdoor use not available 	HP terminal box	<ul style="list-style-type: none"> ● Easy wiring ● Light available (optional - 100, 200 VAC only) 	 4M 4N
		Heat proof class B mold with diode	<ul style="list-style-type: none"> ● A diode is mounted on the coil section for direct-current conversion (AC-DC conversion) ● AC dedicated (50/60 Hz common) ● Heat proof temperature 130°C ● Protection property symbols: IP21 or equivalent ● Perfect for places where heat can be a problem ● Outdoor use not available 	Lead wire	<ul style="list-style-type: none"> ● Lead wire length 300 mm ● Conduit (CTC19) for direct conduit wiring can be mounted 	 5A
		Heat proof class B mold with diode	<ul style="list-style-type: none"> ● A diode is mounted on the coil section for direct-current conversion (AC-DC conversion) ● AC dedicated (50/60 Hz common) ● Heat proof temperature 130°C ● Protection property symbols: IP21 or equivalent ● Perfect for places where heat can be a problem ● Outdoor use not available 	HP terminal box	<ul style="list-style-type: none"> ● Easy wiring ● Light available (optional - 100, 200 VAC only) 	 5M 5N
		Heat proof class B mold with diode	<ul style="list-style-type: none"> ● A diode is mounted on the coil section for direct-current conversion (AC-DC conversion) ● AC dedicated (50/60 Hz common) ● Heat proof temperature 130°C ● Protection property symbols: IP65 or equivalent ● Perfect for places where heat can be a problem ● Outdoor use not available 	HP terminal box	<ul style="list-style-type: none"> ● Easy wiring ● Light available (optional - 100, 200 VAC only) 	 5I 5J *1
		Conduit		<ul style="list-style-type: none"> ● Use a conduit (CTC19 or G1/2) when using direct conduit wiring for the open frame lead wire. 	 G H	

1: Only ADK1 is supported.

APK21/ADK21

Open frame type		Appearance		
Open frame type	Heat proof class B mold	<ul style="list-style-type: none"> ● DC and AC ● Heat proof temperature 130°C ● Protection property symbols: IP65 or equivalent ● Outdoor use not available 	Lead wire <ul style="list-style-type: none"> ● Lead wire length 300 mm ● Direct conduit wiring thread CTC19 integrated 	 3A
	Heat proof class B mold	<ul style="list-style-type: none"> ● DC and AC ● Heat proof temperature 130°C ● Protection property symbols: IP21 or equivalent ● Outdoor use not available 	HP terminal box <ul style="list-style-type: none"> ● Easy wiring ● Light available (optional - 100, 200 VAC / 24, 100 VDC only) 	 3M 3N
	Heat proof class H taped	<ul style="list-style-type: none"> ● AC dedicated ● Heat proof temperature 180°C ● High temperature fluid and high ambient temperature available ● Protection property symbols: IP00 ● Outdoor use not available 	Lead wire <ul style="list-style-type: none"> ● Lead wire length 300 mm ● Direct conduit wiring thread CTC19 integrated 	 4A
			HP terminal box <ul style="list-style-type: none"> ● Easy wiring ● Light available (optional - 100, 200 VAC only) 	 4M 4N
	Heat proof class B mold with diode	<ul style="list-style-type: none"> ● A diode is mounted on the coil section for direct-current conversion (AC-DC conversion) ● AC dedicated (50/60 Hz common) ● Heat proof temperature 130°C ● Protection property symbols: IP65 or equivalent ● Perfect for places where beat can be a problem ● Outdoor use not available 	Lead wire <ul style="list-style-type: none"> ● Lead wire length 300 mm ● Direct conduit wiring thread CTC19 integrated 	 5A
	Heat proof class B mold with diode	<ul style="list-style-type: none"> ● A diode is mounted on the coil section for direct-current conversion (AC-DC conversion) ● AC dedicated (50/60 Hz common) ● Heat proof temperature 130°C ● Protection property symbols: IP21 or equivalent ● Perfect for places where beat can be a problem ● Outdoor use not available 	HP terminal box <ul style="list-style-type: none"> ● Easy wiring ● Light available (optional - 100, 200 VAC only) 	 5M 5N
			Conduit <ul style="list-style-type: none"> ● Use a conduit (G1/2) when using direct conduit wiring for the open frame lead wire. 	 H

- HNB/G
- USB/G
- FAB/G
- FGB/G
- FVB
- FWB/G
- FHB
- FLB
- AB
- AG
- AP/AD
- APK/ADK
- For dry air
- Explosion proof
- HVB/HVL
- SAB/SVB
- NP/NAP/NVP
- CHB/G
- MXB/G
- Other G.P. systems
- PD/FAD/PJ
- CVE/CVSE
- CPE/CPD
- Medical analysis
- Custom order

General purpose valve
Pilot operated/Pilot kick type 2 port solenoid valve



Safety precautions

Always read this section before starting use.

Pilot operated 2 port solenoid valve (AP/AD) and pilot kick type 2 port solenoid valve (APK/ADK)

Design & Selection

WARNING

1 Working fluid

- (1) When using this valve for dry air or inert gas, the life can be shortened considerably due to wear. Use a valve for dry air.
- (2) This valve cannot be used for maintaining the vacuum.

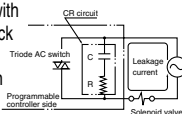
CAUTION

1 Fluid viscosity

The fluid viscosity must be 50 mm²/s or less. Malfunctions could occur if the viscosity is higher than 50 mm²/s. (This value is 20 mm²/s or less for the APK Series.)

2 Leakage current from other fluid control components

When operating the solenoid valve with a programmable controller, etc., check that the output leakage current from the programmable controller is within the following specifications.



Series no.	Voltage		AC diode		DC	
	100 V	200 V	100 V	200 V	12 V	24 V
AP, AD	6 mA or less	3 mA or less	2 mA or less	1 mA or less	2 mA or less	1 mA or less
APK, ADK	6 mA or less	3 mA or less	2 mA or less	1 mA or less	2 mA or less	1 mA or less

Installation, Piping & Wiring

CAUTION

1 Installation

- (1) As a general rule, the valve must be installed vertically with the coil facing upward.

2 Piping

- (1) If the pipe vibrates when the solenoid valve is opened and closed, securely fix the piping.
- (2) When passing steam, steam generated from a boiler will contain a large amount of drainage. Always install a drain trap.
- (3) When passing steam, water replenished to the boiler will contain matters such as "calcium salt" and "magnesium salt". These matters will react with oxygen and carbon oxide causing scales and sludge, so always install a "water softener" and a filter for steam.
- (4) When the regulator and solenoid valve are directly coupled, the parts could mutually vibrate causing resonance and chattering.
- (5) If the piping cross-section area on the fluid inlet is reduced, the operation may become unstable due to a differential pressure fault during valve operation. The piping on the fluid inlet must have a size that matches the valve port size.

3 Wiring

- (1) Refer to page 53 in the Introduction for details on connecting the terminal box.

When Using

CAUTION

1 Instantaneous leakage

With the pilot operated type or pilot kick type 2 port valve, if sudden pressure is applied when the pump starts while the valve is closed, the valve may open for an instant causing fluid to leak. Caution is required during use.

2 Operation

Do not apply back pressure. The valve could malfunction.

3 Water hammer

If water hammering occurs causing a problem, consider using the CKD "WHL type" or "RSV type" solenoid valve or a motor valve.

4 Manual operation

Always observe the following points when using a manual override.

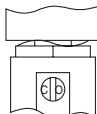
<For NO (normally open) type>

Opening: Insert a flat-tip screwdriver into the slit on the manual shaft, and turn it approx. 120° to the right or left. The plunger will rise up, and the valve will open.

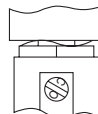
The open state is held even when the screwdriver is removed.

Always return the valve to the original position after use.

Closing: Turn the manual shaft from the open position to the vertical position. The plunger will lower and the valve will close. (Refer to the following drawings.)



Valve closed



Valve opened



Valve opened

<For NO (normally open) type>

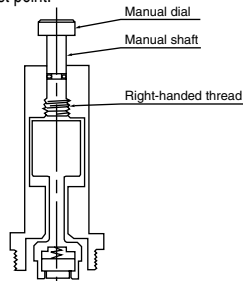
(1) Closing the valve with manual operations

The manual shaft is threaded, so hold the manual dial and rotate the shaft clockwise.

When the manual dial has been rotated downward 5 to 6 mm and no longer rotates, the solenoid valve will switch to closing operation.

(2) Resetting (when not using manual override)

Always rotate the manual dial counterclockwise and return it to the highest point.



Maintenance

CAUTION

1 Thermal insulation cover

When piping for steam or hot water, etc., use an insulating cover structure that can be disassembled for maintenance purposes. Avoid placing an insulating cover on the entire solenoid valve or on the coil section. The coil could burn.

2 Tightening torque

When disassembling or assembling, tighten the body bolt, core assembly and nut with the following tightening torques.

		Body bolt tightening torque	Core assembly tightening torque	Nut tightening torque
AP ¹¹ ₁₂	8A	3 to 4 N·m	30 to 45 N·m (45 to 60 N·m for (APK11-15A to 25A))	8 to 16 N·m
AD ¹¹ ₁₂	10A			
APK11	15A	5 to 7 N·m		
ADK ¹¹ ₁₂	20A			
	25A	9 to 12 N·m		
AP ²¹ ₂₂	32 ^A _F	18 to 28 N·m	80 to 120 N·m	
AD ²¹ ₂₂	40 ^A _F			
	50 ^A _F			
APK21	32 ^A _F			
ADK21	40 ^A _F			
	50 ^A _F			

Working Environment

CAUTION

IP65 (IEC60529 (IEC529:1989-11)) standards are applied to the test. Avoid use in conditions where water or cutting oil directly contacts the valve.

Explanation of protection property symbols and examination method of IP65

●Protective structure

Note: IP-65 is a standard as followings.

■IEC (International Electrotechnical Commission) standards


(IEC60529 (IEC529:1989-11))

IP- * * □ □

Protection property symbols (International Protection)

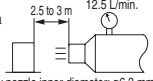
1st characteristic number (protection grade for foreign solid)

Grade	Degree of protection
6	Dust proof type Powder and dust do not enter inside.



2nd characteristic number (protection grade for entry of water)

Grade	Degree of protection	Overview of test method (fresh water is used)
5	Protection for jet No harmful effects occur even when water is sprayed with nozzles from all directions.	Using the following test device, spray water for 1 minute per 1 m ² of test sample (exterior) surface area from all directions, for a total of 3 minutes or more. 2.5 to 3 m 12.5 L/min. Spray nozzle inner diameter: φ6.3 mm



HNB/G

USB/G

FAB/G

FGB/G

FVB

FWB/G

FHB

FLB

AB

AG

AP/
AD

APK/
ADK

For
dry air

Explosion
proof

HVB/
HVL

SAB/
SVB

NP/NAP/
NVP

CHB/G

MXB/G

Other G.P.
systems

PD/FAD/
PJ

CVE/
CVSE

CPE/
CPD

Medical
analysis

Custom
order

General purpose valve
Photooperated/Pilot kick type 2 port solenoid valve

2, 3 port solenoid valve for dry air (general purpose valve)

Electronic Catalog file list

2, 3 port solenoid valve for dry air (general purpose valve)

Direct acting 2 port AB_Z (pages 316 to 317)

Electronic Catalog file list is applied to "CAD DATA 2006".

Model no.	DXF		MICRO CADAM
	Folder name	Filename	Filename (GROUP: CAD, USER: STDLIB)
AB31-Z	AB_Z	ab31_z	CKD-AB31-Z
AB31-Z-K/H		ab31_z_k_h	CKD-AB31-Z-K/H
AB31-Z-A		ab31_z_a	CKD-AB31-Z-A
AB31-Z-SUS		ab31_z_sus	CKD-AB31-Z-SUS
AB41-02-Z		ab41_02_z	CKD-AB41-02-Z
AB41-02-7-Z		ab41_02_7_z	CKD-AB41-02-7-Z
AB41-03/04-Z		ab41_03_04_z	CKD-AB41-03/04-Z
AB41-Z-K/H		ab41_z_k_h	CKD-AB41-Z-K/H
AB41-02-Z-A		ab41_02_z_a	CKD-AB41-02-Z-A
AB41-02-7-Z-A		ab41_02_7_z_a	CKD-AB41-02-7-Z-A
AB41-02-Z-SUS		ab41_02_z_sus	CKD-AB41-02-Z-SUS
AB41-02-7-Z-SUS		ab41_02_7_z_sus	CKD-AB41-02-7-Z-SUS
AB41-03/04-Z-SUS		ab41_03_04_z_sus	CKD-AB41-03/04-Z-SUS
GAB3-Z		gab3_z	CKD-GAB3-Z
GAB3-Z-A		gab3_z_a	CKD-GAB3-Z-A
Mounting plate, cable gland, conduit		ab_ag_z_op	CKD-AB/AG-Z-OP

Direct acting 3 port AG_Z (pages 326 to 327)

Model no.	DXF		MICRO CADAM
	Folder name	Filename	Filename (GROUP: CAD, USER: STDLIB)
AG3-Z	AG_Z	ag3_z	CKD-AG3-Z
AG3-Z-K/H		ag3_z_k_h	CKD-AG3-Z-K/H
AG3-Z-A		ag3_z_a	CKD-AG3-Z-A
AG3-Z-SUS		ag3_z_sus	CKD-AG3-Z-SUS
AG4-02-Z		ag4_02_z	CKD-AG4-02-Z
AG4-03-Z		ag4_03_z	CKD-AG4-03-Z
AG4-Z-K/H		ag4_z_k_h	CKD-AG4-Z-K/H
AG4-02-Z-A		ag4_02_z_a	CKD-AG4-02-Z-A
AG4-03-Z-A		ag4_03_z_a	CKD-AG4-03-Z-A
AG4-02-Z-SUS		ag4_02_z_sus	CKD-AG4-02-Z-SUS
AG4-03-Z-SUS		ag4_03_z_sus	CKD-AG4-03-Z-SUS
GAG3-Z		gag3_z	CKD-GAG3-Z
GAG3-Z-A		gag3_z_a	CKD-GAG3-Z-A
Mounting plate, cable gland, conduit		ab_ag_z_op	CKD-AB/AG-Z-OP

Explosion proof direct acting 2 port AB*E-Z (pages 342 to 343)

Model no.	DXF		MICRO CADAM
	Folder name	Filename	Filename (GROUP: CAD, USER: STDLIB)
AB41E-02-Z	AB_E_Z	ab41e_02_z	CKD-AB41E-02-Z
AB41E-02-7-Z		ab41e_02_7_z	CKD-AB41E-02-7-Z
AB41E-02-Z-A		ab41e_02_z_a	CKD-AB41E-02-Z-A
AB41E-03-Z-A		ab41e_03_z_a	CKD-AB41E-03-Z-A
Accessory (mounting plate, manual mounting plate)		a_e_f	CKD-A*E-F

Explosion proof direct acting 3 port AG4*E-Z (pages 346 to 347)

Model no.	DXF		MICRO CADAM
	Folder name	Filename	Filename (GROUP: CAD, USER: STDLIB)
AG4E-02-Z	AG_E_Z	ag4e_02_z	CKD-AG4E-02-Z
AG4E-03-Z		ag4e_03_z	CKD-AG4E-03-Z
AG4E-02-Z-A		ag4e_02_zva	CKD-AG4E-02-Z-A
AG4E-03-Z-A		ag4e_03_z_a	CKD-AG4E-03-Z-A
Accessory (mounting plate, manual mounting plate)		a_e_f	CKD-A*E-F

Pilot kick type 2 port ADK_Z (page 352)

Model no.	DXF		MICRO CADAM
	Folder name	Filename	Filename (GROUP: CAD, USER: STDLIB)
ADK11-8/10-Z	ADK_Z	adk11_8_10_z	CKD-ADK11-8/10-Z
ADK11-15-Z		adk11_15_z	CKD-ADK11-15-Z
ADK11-20-Z		adk11_20_z	CKD-ADK11-20-Z
ADK11-25-Z		adk11_25_z	CKD-ADK11-25-Z